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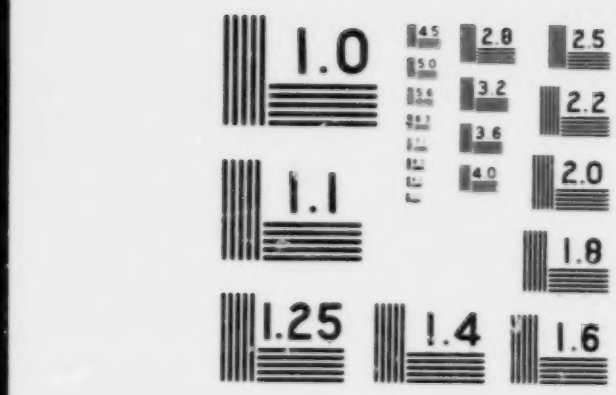

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SWRHL-3r

FINAL REPORT OF OFF-SITE SURVEILLANCE FOR OPERATION DOMINIC II

July 1962

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by the
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ABSTRACT

Operation Dominic II was a series of four nuclear tests conducted on the Nevada Test Site between July 7 and 17, 1962. This report concerns the program of off-site radiological surveillance conducted throughout Operation Dominic II by the U.S. Public Health Service (PHS) for the Atomic Energy Commission (AEC) in accordance with a Memorandum of Understanding between the two agencies. The field and laboratory methods and equipment used, the measurements made, and the results obtained from off-site surveillance of the four events are described.

No cases of alleged radiation sickness or injury to people, livestock, or property developed during the operation. The results of surveillance presented in this report indicate that the safety criteria established by the AEC for the off-site population were not exceeded during Operation Dominic II.

FOREWORD

This report covers the activities of the U. S. Public Health Service's Southwestern Radiological Health Laboratory. The Public Health Service conducts a program in accordance with Memorandum of Understanding No. SF 54 373, held with the Atomic Energy Commission, to fulfill its responsibility to the Commission and to the public to investigate, assess, record, and report the radiological situation in the public area surrounding the Nevada Test Site and the Nellis Air Force Range, and to inform and protect the public should an unacceptable radiological situation develop.

The report summarizes the off-site radiological safety activities carried out during Operation Dominic II, a series of four nuclear tests held at the Nevada Test Site from July 7, 1962 to July 17, 1962. It is to be considered the final report, and it supersedes all previous reports issued by the Public Health Service concerning events of Operation Dominic II. It was neither possible nor desirable to include in this final report every item of data collected. However, data pertaining to exposure or contamination of people or of property in the off-site area have been included.

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Chapter 1

HISTORY AND MISSION OF THE OFF-SITE RADIOLOGICAL SAFETY PROGRAM

In 1954, the U. S. Public Health Service (PHS) and the U. S. Atomic Energy Commission (AEC), by Memorandum of Understanding No. SF 54 373, agreed that the Public Health Service of the Department of Health, Education, and Welfare would operate for the Atomic Energy Commission a program of radiological surveillance and safety in the area surrounding the Commission's Nevada Test Site. Since that time, the Public Health Service has continuously conducted a program of comprehensive environmental sampling and radiation monitoring which is designed to document the radiological situation existing in the off-site area. In addition, the PHS has maintained a public contact and information program to assure the public that all reasonable safeguards are being employed to protect public health and property from radiation hazards. The Off-Site Radiological Safety Program of the Southwestern Radiological Health Laboratory (SWRHL) conducts its present program of radiological monitoring and environmental sampling in the off-site areas surrounding the restricted area enclosed within the Nevada Test Site and the Nellis Air Force Range. This overall complex of the Nevada Test Site (NTS) and the Nellis Air Force Range (NAFR) includes the Nuclear Rocket Development Station (NRDS) and the Tonopah Test Range (TTR) and for simplicity will be called the test range complex throughout this report. Although the objectives of the Off-Site Radiological Safety Program have changed little over the years, the organizational structure o the program and the procedures and techniques employed in its execution have undergone continual modification and improvement as experience and technological developments indicated changes to be made.

During the nuclear test moratorium the PHS established, through its Division of Radiological Health, the Southwestern Radiological Health Laboratory in Las Vegas, Nevada. A part of the SWRHL staff was permanently assigned to the Off-Site Radiological Safety Program, while remaining staff members as well as the facilities of the entire laboratory were ready, whenever necessary, to suspend their routine work to supplement the Off-Site Program.

When the United States resumed nuclear testing activities with the initiation of Operation Nougat[1] on September 15, 1961 the Off-Site Program staff was increased from its interim period level by the addition of specially trained personnel of Civil Service and of the active and reserve Commissioned Corps. The resumption of testing also required an increase in the SWRHL program and staff so that by the end of Operation Nougat and throughout Dominic II approximately 76 PHS personnel were on either active or standby assignment to the Off-Site Program. This total included 25 trained reserve officers who were called to active duty in support of the program during periods of concentrated test activity.

Since Operation Dominic II immediately followed Operation Nougat, the Fiscal Year 1962 series, and since it took place concurrently with events of Operation Storax, the Fiscal Year 1963 series, the monitoring, sampling, public relations, and medical and veterinary consultative aspects of the Off-Site Radiological Safety Program were already in full operation. No new or special activities had to be initiated specifically for Operation Dominic II.

This report gives an account of the Off-Site Radiological Safety Program conducted by the PHS during Operation Dominic II. The safety criteria, operational procedures, and the apparatus used to carry out public

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[1] Final Report of Off-Site Surveillance for Operation Nougat, Sept. 15, 1961 - June 30, 1962, by Off-Site Radiological Safety Program, Southwestern Radiological Health Laboratory, April 24, 1964, SWRHL-1r.

relations, surveillance, medical, and veterinary programs are described, and the information and data collected through these programs are presented and discussed.

Tables and figures which summarize the data or which may be of general interest are included in the body of the report. Tables of individual dose rate readings and tables showing concentrations of radioactive material in individual air samples have been placed in appendices to the report. Detailed tables of data showing background levels of radiation or absence of environmental contamination are not included.

Chapter 2

PUBLIC RELATIONS PROGRAM

An important part of off-site radiological safety activities is the program of public education conducted to assure the public that all reasonable safeguards are being employed to protect health and property from any potential radiation hazard. This is carried out through liaison with state and local health officials and through personal contacts with residents of the off-site area.

In carrying out their routine duties in the off-site area, whether testing is planned or in progress, Public Health Service personnel indicate to local residents their willingness to speak at civic or other public gatherings to explain the programs conducted at the Nevada Test Site and the role of the Off-Site Radiological Safety Organization. Past experience has shown that the greatest contribution to good public relations can be made through individual personal contacts between PHS personnel and off-site residents and public participation in some phases of the operation. In this way, confidence in the government's efforts to protect the public interest has been developed and maintained in residents of the off-site area.

Some feeling of public participation was accomplished through the air sampling programs. All air sampling stations established in the off-site area, with the exception of one in Las Vegas, were operated by local citizens. The people were instructed in the procedures for maintaining the samplers and for changing filters on a predetermined schedule. They were given a supply of spare motors, filters, sample containers, and mailing envelopes, and they were paid a nominal fee to cover the cost of electricity and labor.

A number of off-site residents wore film badge dosimeters which were changed periodically by off-site monitors. Ranchers and farmers from whom milk and water samples were collected were told why the collections were made and how the analyses were performed.

This program of personal contact is more time consuming than that of giving public talks and lectures, but the cooperation of local citizens greatly reduces the manpower required for surveillance and sampling activities.

Chapter 3
MEDICAL AND VETERINARY PROGRAMS

The Public Health Service has been requested by the Atomic Energy Commission to include at least one Medical Officer on its staff. This Medical Officer is responsible for maintaining liaison with local physicians, answering inquiries on the medical effects of radiation, investigating all cases of alleged radiation injury, and conducting meetings for various groups who wish to know about biological effects of radiation.

A special medical program was not established for Dominic II. Rather, the liaison with off-site physicians throughout the Nougat test series was continued. The Medical Officer continued his visits to practicing physicians in the area to insure that they were aware of his availability for consultation should cases of alleged radiation sickness or injury arise. No such cases were brought to his attention during or after Operation Dominic II.

The Public Health Service has also been requested to include the services of a veterinarian in its Off-Site Program capabilities. As for Operation Nougat, this capability was provided by the U.S. Army Veterinary Officer assigned to the Atomic Energy Commission's Nevada Operations Office through the Department of Defense. This Veterinary Officer visited ranchers and farmers in the off-site area to discuss matters pertaining to the health of local animals. In the course of these visits he informed them that veterinary diagnostic service would be provided and corrective action recommended if any problems arose which were felt to be a result of, or aggravated by, testing activities. During Operation Dominic II no direct claims were made against the AEC for radiation damage to livestock, domestic animals, or wildlife.

Chapter 4

SURVEILLANCE PROGRAM

A. SAFETY CRITERIA

Throughout Operation Dominic II, the criteria used for determining the radiological hazard to the off-site population were those established by the Atomic Energy Commission.

> "For planning weapons tests the criterion shall be 3.9 roentgens per year whole body exposure including any exposure from non-weapons test activities (but excluding background and medical X-rays). The criterion of 3.9 roentgens is in the definite context used in the past i.e., every reasonable effort should be made to keep the radiation exposures as low as possible, but for planning purposes, if unanticipated yet credible circumstances could result in estimated doses in excess of 3.9 roentgens per year, then the detonations should be postponed until more favorable conditions prevail. Also, to avoid any given community receiving unusually high exposures over a period of years, the guide shall be not more than 10 roentgens in any consecutive 10 year period."

> "The Guides for radioactivity in air, water, milk and foodstuffs were not to exceed one-tenth the Guides for a 168 hour week listed by the National Bureau of Standards in their Handbook 69."

The external exposure was estimated from doses recorded by film badges worn by off-site residents, or from records of dose rate readings taken in populated areas by PHS radiation monitors and by dose rate recorders. The external exposure excluded background and medical exposures.

The concentrations of radioactivity in air and water, milk and foodstuffs were averaged over a period of one year. The concentrations in these media were determined from analysis of samples collected

from the off-site area. Data obtained during the series of tests which constituted Operation Dominic II showed that the guides were not exceeded.

B. FIELD PROCEDURES

The working field unit of the PHS was the "monitoring team" which was composed of one or two people equipped with various survey instruments, sampling apparatus, tools and supplies. Using dose rate meters or survey instruments, the monitoring teams surveyed roads, areas, and locations within the cloud trajectory. They set up additional air sampling stations and dose rate recorders, augmented routinely operating stations with charcoal cartridge collectors and collected other environmental samples when required. They also noted the presence of people or farm animals in areas not usually inhabited, observed the condition of back roads and trails which might be needed for cloud tracking or surveillance routes, and checked infrequently traveled areas for radio reception and transmission. Working from directives and information received by radio, each team performed its surveillance duties and kept a running log of its activities from the time it was dispatched to its duty station several hours before a scheduled event until the time it reported back to headquarters at the end of its mission.

The highest dose rate readings taken at populated locations by ground monitoring teams during Operation Dominic II have been compiled into the tables found in Appendix A. The significance of the data recorded by monitors during these events is discussed in Chapter 5.

During Operation Dominic II, the PHS used an aerial monitoring team to augment its surveillance program. Cloud tracking missions were carried out by a PHS monitoring team in military aircraft

piloted by Air Force crews. These aerial monitoring teams assisted ground monitors in locating and following the clouds, and worked throughout the operation to develop and test instruments and procedures with which to define not only the cloud position and direction of travel, but also the distribution and magnitude of radioactivity contained within it. Before detonation of a device, the cloud tracking aircraft flew in a standby pattern within sight of Ground Zero. After detonation, the aircraft made a series of passes at several altitudes beginning above Ground Zero and moving gradually downwind. Measurements of radiation intensity were made to determine the distribution and magnitude of radioactive material within the cloud, and to define concentration gradients where possible. These cloud tracking missions were terminated when the cloud had dispersed or the activity it contained had dropped to levels too low for measurement, or when flying conditions necessitated termination of the flight.

Throughout each aerial cloud tracking mission, the PHS aerial monitors were in radio contact with Net Control (centralized radio communication station) at CP-1. In this way they immediately made known to control personnel, and through them to ground monitors, all information which could be used to increase the effectiveness of the surveillance program.

C. AERIAL AND GROUND MONITORING INSTRUMENTS

Two instrument systems were utilized for aerial cloud tracking. The first was a detector-recorder system designed and assembled by Public Health Service personnel. The instrument consisted of a small transistorized amplifier through which gamma radiation detected by a Precision Model 111 "Scintillator" could be recorded by an Esterline-Angus strip chart recorder. This scintillator was the same instrument as that used by ground monitoring teams and is described on page 11.

The second system used for aerial cloud tracking was the Portable Aerial Survey Meter SBL-2, developed by Edgerton, Germeshausen, and Grier, Inc., and delivered to the PHS early in 1961. The system was a transistorized, battery operated, portable scintillation detector and recorder designed to measure gamma dose rate from 0.2 to 2000 milliroentgens per hour (mr/hr) under a variety of environmental conditions. The system could be used for either ground or aerial surveys since it would read gamma dose rate incident at the detector or, through three gain selections, would compensate for altitudes of 100, 300, and 500 feet above ground while also compensating for aircraft attenuation. The readout of measurements taken at these altitudes was equivalent to the dose rate existing one meter above the terrain. The gain selection which gave readout of incident dose rate was more applicable to the geometry of a radioactive cloud or a small-dimensioned ground source. The SBL-2 did not, however, compensate for attenuation of radiation by the aircraft when reading incident dose rate. Other survey instruments of the type used by ground monitoring teams were carried in the aircraft as back-up systems, so that readings of several detectors could be compared.

Each ground monitoring team carried four types of survey instruments which allowed measurements up to 200 mr/hr of beta plus gamma radiation and up to 50 roentgens per hour of gamma radiation alone.

Beckman Model MX-5

This instrument is a Geiger detector having a range of 0 to 20 mr/hr using three scale settings. Its external probe has a beta shield which slides over the probe's window, to allow measurement of dose rate from either gamma or beta plus gamma radiation.

Tracerlab AN/PDR-T1B

The Tracerlab T1B is an air ionization chamber detector which measures dose rate from gamma radiation only. It has a range of 0 to 50,000 mr/hr in five multiplication settings for its meter readings of 0 to 5. Although its sensitivity to dose rates under 5 mr/hr is inadequate for monitoring low levels of activity, this makes the T1B an excellent instrument for use in higher radiation fields.

Precision Model 111 Standard "Scintillator"

This instrument, manufactured by Precision Radiation Instruments, Inc., consists of an external probe containing a sodium iodide crystal with most of the electronic components, and a battery box to which the probe is connected by a cable. Its range is 0 to 5 mr/hr using a six position range selector with two rows of scale divisions on the meter.

Eberline Model E500-B

The E500-B has a range of 0 to 2000 mr/hr through use of a five position range selector and two halogen-filled GM tubes. The lower four range selections of 0.2 to 200 mr/hr utilize an external Anton 112 tube in a probe equipped with a removable beta shield. Thus dose rates of up to 200 mr/hr from beta plus gamma radiation can be measured. The highest range selector position utilizes an Anton 302 tube located within the instrument case to measure gamma dose rates up to 2000 mr/hr.

D. FILM BADGE DOSIMETRY

The film badge dosimeter used during Dominic II was the DuPont type 556, supplied and read by the Reynolds Electrical Engineering Company, Inc., (REECo) Radiological Sciences Department. These badges contained two film components, the low range component No. 508 for exposures of 0.03 to 5.0 roentgens, and the high range component No. 834 for measuring dose from exposures of 3.0 to 1000 roentgens.

All badges which showed no exposure were reported by REECo as less than 30 mr and were considered by the PHS to represent a maximum dose of 30 mr.

E. ENVIRONMENTAL SAMPLING

1. Air

Continuous samples of air were taken by collecting airborne particulate material on Gelman type E glass fiber filters designed to be 99.6% efficient for collecting particles of diameters greater than 0.25 microns and 98% for 0.05 micron particles. These filters, held in commercially available filter heads fitted to high volume samplers, had an effective sampling area of 63 square inches. During Operation Dominic II, samplers made by Staplex Company and General Metal Works were used exclusively. These samplers used Electrolux motors and fans to draw air through the large filters at flow rates of 45 to 55 cfm (1.3 - 1.6M^3/m). The throat of the motor housing of each sampler was machined to hold a 3-1/4" diameter activated charcoal cartridge made by Mine Safety Appliances Co. With the MSA cartridge in place behind the filter, the normal air flow was between 20 and 30 cfm. Actual air flow was measured by inserting a rotameter in the orifice provided at the back of each unit.

2. Water

Water samples were collected from a variety of sources throughout the operation. Samples were collected in polyethylene bottles by field personnel or monitoring teams. Reproducible sampling procedures were required if activity in samples from different sources was to be compared. Therefore, running water was collected whenever possible, and samples from ponds or puddles were taken from the surface in undisturbed areas close to the shore.

Varying volumes were obtained by this method, but further refinement of collection procedures was not feasible. As a result, 400 milliliters of sample were used for gross beta analysis, and gamma emitters were analyzed in either 400 ml or one gallon aliquots, depending on the volume collected.

3. Milk

One gallon samples of raw milk were collected from locations in Nevada and Utah throughout the month of July. These were brought to the laboratory as soon as possible for analysis.

F. SAMPLE ANALYSIS

1. Air Samples

Gross beta counting of air filter samples was done with a large area (8"x 10") gas flow proportional probe connected to a high speed scaler to minimize dead time corrections. Efficiency for this system, based on a strontium-yttrium-90 standard of the same size, was approximately 30 percent. Samples collected on a routine basis were held for five days to allow decay of natural radioactivity prior to the first count. The second count was made seven days after the first, and a $T^{-1.2}$ extrapolation was applied to correct to mid-point or end of collection period.

Filters collected for the Dominic II specific events were counted as soon as possible, and then at frequent intervals thereafter, to obtain an empirical decay curve by which activity could be extrapolated to mid-point of collection or time of cloud passage. Where indicated by a high initial beta count, samples were submitted to gamma spectrum analysis for qualitative identification of gamma emitting isotopes. If the presence of fresh fission products was confirmed, these samples were scanned several times and an attempt was made to quantitate these isotopes by

the decay pattern of various regions of the spectrum. Longer lived isotopes, or those for which standards were available, were quantitated by a matrix method which corrects for mutual interference between isotopes. Spectrum analysis of all filters was accomplished by folding the 8"x 10" filter paper in eighths and placing it directly on top of a 4"x 4" NaI (Tl) crystal coupled to a multi-channel analyzer.

The same method of gamma spectrum analysis was applied to determine the type and quantity of gamma emitting isotopes collected in the charcoal cartridges. No holding period to allow for radon decay was required and cartridges were analyzed as soon as possible after collection.

Although geometry remained constant for spectral analysis of air filters and of charcoal cartridges, the volume of air collected varied greatly. Therefore, the minimum detectable concentration of a gamma emitter cannot be stated for air samples measured this way. In general, a total activity of less than 500 picocuries* for the shorter lived materials (Sr^{91}, Ru^{103}, Ru^{106}, Te^{132}, I^{132}, I^{133}, I^{135}, Xe^{135}) and of less than 100 pc for longer lived isotopes (I^{131}, Ba^{140}, Zr^{95}, Cs^{137}) could not be quantitated.

2. Water Samples

Water samples were counted for gamma emitting isotopes in a one gallon, inverted well beaker placed over the 4"x 4" crystal of a gamma pulse height analyzer system. If the sample was of insufficient size to permit this geometry, a 400 ml aliquot was placed in a "cottage cheese tub" container and centered on top of the crystal assembly.

*one picocurie (pc) equals 2.2 disintegrations per minute

Approximate efficiencies for the two methods were:

Container	Energy	Efficiency
Beaker	0.36 Mev	6.5%
	1.6 Mev	2.4%
Cheese tub	0.36 Mev	7.2%
	1.6 Mev	2.3%

Quantitative determination of the gamma emitting isotopes followed the procedure used for analysis of air samples.

Water samples were analyzed for gross beta activity by slowly evaporating an aliquot to dryness in a 2" diameter stainless steel planchet and counting the beta activity in a low background counter. The results obtained were used in conjunction with gamma results to determine whether radiochemical analysis of strontium isotopes was warranted. Figure 1 shows the locations of water sampling stations.

3. Milk Samples

One gallon samples of milk were placed in aluminum beakers having inverted well geometry, and were analyzed for gamma emitters by the matrix method. This permitted simultaneous analysis for iodine-131, barium-140, cesium-137, and potassium-40. When required, chemical separation of the strontium isotopes was made along with chemical determination of stable calcium. The total strontium was counted in a low background beta counter, as was the yttrium-90 daughter of strontium-90. Detection efficiency ranged from 33% for strontium-90 to 37% for yttrium-90. Strontium-89 was determined by the difference between total strontium and strontium-90 as calculated from the equilibrium value of its yttrium daughter. These procedures resulted in the following detection limits for samples of milk or

Figure 1. Water sampling locations.

water:

strontium-89	5 pc/l
strontium-90	1 pc/l
iodine-131	10 pc/l (routine samples)
iodine-131	20 pc/l (special samples)*
barium-140	20 pc/l
cesium-137	5 pc/l
zirconium-95	20 pc/l

*Special samples are those which are collected for a specific event. Because of the necessity for quick results, the samples are analyzed more rapidly than are routine samples and, therefore, the detection limit is higher.

G. REPORTING

Surveillance program activities and findings were reported to the Test Manager, Nevada Test Site Organization, NVOO, at frequent intervals throughout Operation Dominic II. Reports fell into two general classes: reports of routine surveillance activities, and reports of additional surveillance performed in support of each event.

A verbal report was made six hours after the detonation of each device and later an interim report was submitted. This interim report contained a description of the surveillance performed, the data obtained from monitoring and from sampling, and a tentative evaluation of the results. Occasionally, supplementary reports were made to transmit data or findings which were not available at the time the interim report was submitted. Each month a report was issued which contained the results of the routine air, water, and milk sampling.

The present final report is essentially a compilation of the routine monthly reports and the interim reports issued during the Dominic II series.

Chapter 5

SUMMARY AND DISCUSSION OF RESULTS AND DATA

A. DESCRIPTION OF OPERATION DOMINIC II

As noted previously, Operation Dominic II consisted of a series of four nuclear detonations conducted in July 1962, by the Department of Defense at the Atomic Energy Commission's Nevada Test Site. Devices were detonated only under conditions that would minimize exposures to populated off-site areas. Table 1 lists the events of the Dominic II series in chronological order.

Table 1. Nuclear events of Operation Dominic II.

Event	Type	Area	Date	Time(PDT)
Little Feller II	slightly above ground	18	7/07/62	1200
Johnie Boy	shallow under ground	18	7/11/62	0945
Small Boy	slightly above ground	5	7/14/62	1130
Little Feller I	slightly above ground	18	7/17/62	1000

Of the four events, it was possible to relate off-site activity to two events with certainty. It was not possible to detect activity off-site which could be directly associated with the Little Feller II event. This was partly due to residual activity from the Sedan nuclear cratering experiment (reported as PNE-200F) conducted the day before at the NTS and partly because of low winds which resulted in fallout of the radioactive materials on site. Little Feller I may have contributed to the activity detected off-site; however, the extent of the contribution is in doubt due to residual contamination from the Sedan and Small Boy events. Surveillance results for the Little Feller I event are presented in Section C part 4 of this chapter.

B. SUMMARY OF SURVEILLANCE PROVIDED AND RESULTS OBTAINED

The type and extent of surveillance provided by the Off-Site Radiological Safety Program for events of Operation Dominic II have been indicated in Chapter 4 and are reflected in the tables and appendices to this report. This section gives a brief resume of the coverage provided for the four events.

1. External Radiation Dose Rates

The highest external gamma dose rates measured by ground monitoring teams occurred after the Small Boy event. Maximum readings were 48 mr/hr forty miles north of the Desert Game Range Station at 1630 on July 14, and 14 mr/hr thirteen miles south of Alamo, Nevada on Highway 93 at 1700. Both of these locations are unpopulated. The populated location having the highest gamma dose rate observed during Operation Dominic II was Rattlesnake Maintenance Station, Nevada where a reading of 3 mr/hr was taken six hours and two minutes after the Johnie Boy detonation. The highest dose rates at populated locations as measured by ground monitoring are presented in Appendix A.

2. Film Badge Exposures

It was not practical to attempt to assign a film badge exposure dose to any particular Dominic II event. This is due to the Sedan nuclear cratering experiment which occurred the day before the first Dominic II event, and to the short duration of Dominic II. Further, the purpose for conducting the off-site film badge program was to insure that no over-exposures had occurred. Film badges which were exchanged during Dominic II and

which had an exposure equal to or greater than the threshold limit (30 mr) are listed in Tables 2 and 3. Not included in these tables are those badges which were listed in the reports of Project Sedan and Operation Nougat.

Table 2. Off-site personnel film badge results for Operation Dominic II.

LOCATION	PERSON	EXPOSURE PERIOD	DOSE (mr)
Adaven, Nevada	100	7/10-8/08	65
	101	7/10-8/08	85
	102	7/10-8/08	80
Alamo, Nevada	103	6/04-7/25	75
	104	6/04-7/26	50
Blue Eagle Ranch (Jim Sharp)	105	7/04-7/10	110
	106	7/04-7/10	75
	107	7/04-7/10	85
	108	7/10-8/11	45
	109	7/10-8/11	50
Blue Eagle Ranch (Roy Sharp)	110	7/10-8/10	35
	111	7/10-8/10	40
	112	7/10-8/10	40
	113	7/10-8/10	30
Caliente, Nevada	114	6/11-7/26	50
	115	6/05-7/25	55
	116	6/04-7/26	55
	117	6/05-7/26	65
	118	6/04-7/26	40
	119	6/12-7/26	55
	120	6/05-7/25	50
	121	6/04-7/26	50
	122	6/05-7/26	55
Casey Ranch	123	7/10-8/08	80
	124	6/20-7/10	70
	125	7/10-8/08	65
	126	7/10-8/08	80
Diablo, Nevada	127	7/09-8/16	95
	128	7/09-8/16	90
	129	7/09-8/16	130

Table 2. (con't)

LOCATION	PERSON	EXPOSURE PERIOD	DOSE (mr)
Duckwater, Nevada	130	7/10-8/10	55
	131	7/10-8/09	55
Ely, Nevada	132	7/04-7/10	110
	133	7/10-8/10	40
Gardner Ranch	134	7/11-8/09	30
Hiko, Nevada	135	6/04-7/25	50
Hot Creek Ranch	136	6/19-7/20	80
Lockes, Nevada	137	7/10-8/10	40
Manzonie Ranch	138	7/10-8/10	45
	139	7/10-9/03	50
	140	7/10-8/10	35
Nyala, Nevada	141	7/10-8/08	85
	142	7/10-8/08	80
	143	7/10-8/08	80
	144	7/10-8/08	80
	145	7/10-8/08	110
	146	7/10-8/08	85
	147	7/10-8/08	100
	148	7/10-8/08	80
	149	7/10-8/08	80
Panaca, Nevada	150	6/05-7/25	50
	151	6/05-7/26	50
	152	6/05-7/25	50
Pine Creek Ranch	153	7/10-8/08	125
	154	7/10-8/08	130
Pioche, Nevada	155	6/05-7/25	50
	156	6/05-7/25	50
	157	6/12-7/25	65
	158	6/05-7/25	95
	159	6/05-7/25	55
	160	6/05-7/25	50
Tonopah Test Range	161	7/05-8/10	35
Twin Springs Ranch	162	7/10-8/16	160
	163	7/09-8/16	115
	164	7/10-8/16	110

Table 2. (con't)

LOCATION	PERSON	EXPOSURE PERIOD	DOSE (mr)
Uhalde Ranch, Nevada	165	7/10-8/08	120
	166	7/10-8/08	65
	167	7/10-8/08	85
	168	7/10-8/08	65
	169	7/10-8/08	65
	170	7/10-8/08	160

Table 3. Station film badges for Operation Dominic II.

LOCATION (NEVADA)	EXPOSURE PERIOD	DOSE (mr)
Ash Meadows	7/03-7/23	75
Blue Eagle Ranch	7/10-8/10	50
Blue Jay	7/09-8/16	90
Currant Creek	7/10-8/09	35
Diablo	7/09-8/01	235
Duckwater	7/10-8/09	50
Goldspar	7/03-7/23	75
Lockes	7/10-8/10	65
Mesquite	4/24-7/12	40
Nyala	6/20-7/10	75
	7/10-8/08	80
Pahrump	7/03-7/23	41
Penoyer	7/10-8/01	99
Pine Creek Ranch	7/10-8/08	160
Reed	7/09-8/01	580
Simpson Ranch	7/10-8/08	85
Shell Oil Site	7/10-8/10	60
Uhalde's Ranch	7/10-8/08	85
University, Las Vegas	7/02-7/24	45
Warm Springs	7/09-8/01	31

3. Air Sampling

The highest concentrations of radioactivity in air were noted in samples taken after the Small Boy event. On a single glass fiber air filter the maximum concentration of gross beta activity was 140,000 pc/M^3, corrected for decay to the time of peak cloud passage. This sample was taken at Alko, Nevada on July 14, 1962.

The highest radioiodine concentration in air, as measured by gamma pulse height analysis of any one filter, was also associated with the Small Boy event. The glass fiber prefilter from the sampler at Caliente, collecting 1570 cubic meters of air between 1400 hours on July 14 to 1500 hours on July 15, contained 1,100 pc/M^3 of I^{131} corrected for decay to the time of peak cloud passage.

The results of the five highest air sampling filters and cartridges collected following the Johnie Boy, Small Boy and Little Feller I events are shown in the tables of Appendix B. None of the filters or cartridges collected following the Little Feller II event contained radioactivity above background.

4. Radioactive Contamination of Milk

Milk samples collected and analyzed during July 1962 indicate that the radionuclides found were primarily due to a combination of the Sedan experiment and Dominic II events. For this reason it is not practical or possible to assign nuclide concentrations in milk to any particular Dominic II event or to the entire operation.

The results of all milk samples taken during July 1962 are listed in Table 4. The radionuclide concentrations were near the detection limit at most locations by the end of August 1962. Samples collected after July are listed in subsequent SWRHL reports.

Table 4. Results of milk samples for Operation Dominic II.

COLLECTION DATA		RADIOCHEMICAL DATA						
		ACTIVITY (pc/l)					CONCENTRATION(gm/l)	
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Las Vegas, Nevada								
Anderson Dairy	7/12	30	8	10	20	35	1.00	1.8
Arden Dairy	7/12	20	3	10	20	25	1.02	1.6
Bliss Dairy	7/12	30	6	30	<20	40	0.99	1.4
Clark Dairy	7/12	15	4	<10	<20	25	0.98	1.7
Hiland Dairy	7/12	30	5	40	20	40	0.97	1.7
Hinies Dairy	7/11	10	3	<10	<20	45	1.02	1.3
Meadow Gold Dairy	7/11	30	10	<10	<20	55	0.96	1.4
Alamo, Nevada	7/17	10	3	2300	160	95	1.13	1.5
	7/24	--	--	910	100	140	---	1.8
	7/25	--	--	920	70	90	---	1.6
	7/26	--	--	1000	40	80	---	2.2
	7/27	--	--	930	50	70	---	1.8
	7/28	--	--	730	90	70	---	1.6
	7/29	--	--	310	50	30	---	1.6
	7/30	--	--	280	30	40	---	1.6
	7/31	--	--	430	20	50	---	2.0
Blue Eagle Ranch, Nevada	7/25	--	--	1800	320	400	---	1.2
	7/31	--	--	800	210	340	---	1.4
Bunkerville, Nevada	7/03	15	5	<20	<20	90	1.04	1.6

Table 4. Results of milk samples for Operation Dominic II. (cont)

COLLECTION DATA		RADIOCHEMICAL DATA						
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	ACTIVITY (pc/l)					CONCENTRATION(gm/l)	
		Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Caliente, Nevada	7/02	15	9	<20	<20	25	1.03	1.4
	7/19	30	5	6900	<20	240	1.14	2.2
	7/23	--	--	3500	110	185	---	1.6
	7/25	--	--	1800	40	75	---	1.6
	7/27	--	--	1500	80	220	---	1.7
	7/28	--	--	1700	50	70	---	1.5
	7/30	--	--	1700	70	60	---	1.4
	7/30	--	--	1300	20	30	---	1.6
	7/31	--	--	1300	30	35	---	1.3
Draper, Utah	7/20	--	--	1300	290	385	---	1.6
	7/20	--	--	160	30	185	---	1.7
	7/20	--	--	90	20	280	---	1.7
Elko, Nevada	7/20	255	12	370	180	115	1.3	1.0
	7/26	--	--	1500	100	115	---	1.2
Ely, Nevada	7/24	--	--	2800	190	335	---	1.6
	7/26	--	--	2000	140	305	---	1.0
	7/27	--	--	1500	150	220	---	1.7
	7/28	--	--	1200	320	310	---	1.8
	7/29	--	--	770	90	180	---	1.2
	7/30	--	--	630	60	160	---	1.7
	7/31	--	--	400	60	125	---	0.9

Table 4. Results of milk samples for Operation Dominic II. (cont)

COLLECTION DATA		RADIOCHEMICAL DATA						
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	ACTIVITY (pc/l)					CONCENTRATION(gm/l)	
		Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Escalante, Utah	7/11	40	7	<10	<20	65	1.03	1.6
Kamas, Utah	7/27	--	--	2600	360	380	---	1.8
	7/30	--	--	1400	210	285	---	1.8
	7/30	--	--	1500	200	300	---	1.6
Logan, Utah	7/11	--	--	110	50	185	---	1.7
	7/12	--	--	150	40	165	---	1.8
	7/13	--	--	260	20	165	---	1.8
	7/14	--	--	220	20	150	---	1.7
	7/15	--	--	160	30	160	---	1.5
	7/16	--	--	240	20	150	---	1.5
	7/17	--	--	160	40	140	---	1.7
	7/18	--	--	130	40	140	---	1.5
	7/19	--	--	330	40	155	---	1.6
	7/20	--	--	530	200	330	---	1.4
	7/21	--	--	200	<20	175	---	1.6
	7/22	--	--	240	<20	135	---	1.7
	7/23	--	--	190	<20	200	---	1.4
	7/25	--	--	100	<20	210	---	1.4
	7/26	--	--	210	60	140	---	1.4
	7/27	--	--	110	30	130	---	1.2
	7/28	--	--	130	40	150	---	1.4

Table 4. Results of milk samples for Operation Dominic II. (cont)

COLLECTION DATA		RADIOCHEMICAL DATA						
		ACTIVITY (pc/l)					CONCENTRATION (gm/l)	
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Logan, Utah (Cont.)	7/30	--	--	150	10	140	---	1.4
Lund, Nevada	7/25	--	--	260	30	75	---	1.0
	7/31	--	--	220	<20	60	---	1.7
Newcastle, Utah	7/04	35	8	35	<20	65	1.03	1.6
Oakley, Utah	7/25	--	--	4200	560	530	---	1.6
	7/25	--	--	4400	510	800	---	2.2
	7/27	--	--	2600	570	265	---	1.6
	7/30	--	--	2200	320	220	---	1.6
	7/30	--	--	2100	320	240	---	1.4
Ogden, Utah	7/12	--	--	130	40	175	---	1.5
	7/13	--	--	150	50	160	---	1.6
	7/14	--	--	110	30	175	---	1.7
	7/15	--	--	150	10	140	---	1.6
	7/16	--	--	60	30	150	---	1.5
	7/17	--	--	160	60	150	---	1.7
	7/18	--	--	500	20	390	---	1.3
	7/19	--	--	390	<20	150	---	1.5
	7/21	--	--	490	<20	135	---	1.6
	7/28	--	--	380	20	165	---	1.5

Table 4. Results of milk samples for Operation Dominic II. (cont)

COLLECTION DATA		RADIOCHEMICAL DATA						
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	ACTIVITY (pc/l)					CONCENTRATION(gm/l)	
		Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Ogden, Utah (cont.)	7/29	--	--	380	<10	80	---	1.6
	7/30	--	--	370	<10	105	---	1.6
	7/31	--	--	380	40	70	---	1.6
Panaca, Nevada	7/03	50	5	<20	<20	70	0.98	1.5
	7/26	--	--	620	20	80	---	1.7
	7/28	--	--	140	<20	60	---	2.1
	7/29	--	--	60	<20	60	---	1.6
	7/31	--	--	50	30	60	---	2.0
	7/31	--	--	70	<20	70	---	1.9
Pioche, Nevada	7/26	--	--	170	<20	20	---	1.8
	7/27	--	--	160	20	15	---	1.9
	7/28	--	--	80	<20	35	---	1.7
	7/30	--	--	70	<20	<10	---	1.1
	7/30	--	--	70	20	55	---	1.3
	7/31	--	--	80	20	20	---	1.6
Robbins Ranch, Nevada	7/20	60	7	710	140	175	1.19	2.0
Snyderville, Utah	7/20	--	--	9000	350	2000	---	1.6
	7/20	--	--	5400	270	220	---	1.4
	7/25	--	--	4400	620	1200	---	2.3

Table 4. Results of milk samples for Operation Dominic II. (cont)

COLLECTION DATA		RADIOCHEMICAL DATA						
LOCATION (Azimuth and Distance from CP-1)	DATE COLLECTED	ACTIVITY (pc/l)					CONCENTRATION(gm/l)	
		Sr^{89}	Sr^{90}	I^{131}	Ba^{140}	Cs^{137}	Ca	K
	July 1962							
Snyderville, Utah (cont)	7/25	--	--	2500	460	215	---	1.7
	7/27	--	--	3000	980	990	---	2.7
	7/27	--	--	1400	270	175	---	1.4
	7/30	--	--	2000	540	465	---	1.6
	7/30	--	--	870	170	160	---	1.5
	7/30	--	--	860	200	145	---	1.5
	7/30	--	--	1700	530	440	---	1.4
St. George, Utah	7/23	25	7	30	<20	50	1.16	1.8
Twin Springs(Fallini's Rnch)	7/23	--	--	3200	850	655	---	1.5
Wells, Nevada	7/20	340	17	330	110	125	1.23	1.7
Wendover, Utah	7/19	120	11	200	70	90	1.04	1.5
White River Valley, Nevada	7/25	--	--	730	480	275	---	1.3
	7/31	--	--	740	120	170	---	1.6

5. Radioactive Contamination of Water.

The highest gross beta activity (180 pc/l) in a potable water sample taken during Dominic II came from a water supply, collected on July 28, at Pony Springs, Nevada. The ten highest potable water samples taken during Dominic II are listed in Table 5. This does not include those samples taken during July which were reported by the PHS in the Final Off-Site Report of the Project Sedan Event (PNE-200F).

Table 5. Highest ten potable water sample results for the Operation Dominic II period.

LOCATION	DATE COLLECTED	GROSS BETA ACTIVITY (pc/l)
Pony Springs, Nevada	7/28/62	180
Manzonie Ranch, Nevada	7/25/62	150
Ash Meadows, Nevada	7/23/62	70
Penoyer, Nevada	7/08/62	53
Escalante, Utah	7/09/62	42
Scotty's Jct., Calif.	7/09/62	36
Koyen's Lincoln Mine, Nev.	7/08/62	36
Tonopah, Nevada	7/03/62	33
	7/09/62	28
Lida Jct., Nevada	7/31/62	28

C. SUMMARIES OF INDIVIDUAL EVENTS

Discussed below are the off-site surveillance activities performed for each of the Dominic II events in which detectable radioactivity was released to the off-site area. The events are treated in chronological order. Tables of monitoring and of air sampling data are arranged in chronological order in Appendices A and B.

1. Little Feller II

No detectable radioactivity was released to the off-site area. Figure 2 shows the location of air samplers for this event.

2. Johnie Boy

The Johnie Boy event, 0945 PDT July 11, was the second test of the Dominic II series. The resulting radioactive cloud was carried in a northerly direction by prevailing winds and subsequently divided into two portions. One portion moved towards Highway 6 between Tonopah and Warm Springs, turned to a northeasterly direction and had a width of about 25 to 30 miles. The other portion remained above 11,000 feet MSL and traveled to the northeast.

Eleven mobile monitoring teams and two aerial cloud tracking teams in U. S Air Force U3-A and WB-50 aircraft tracked the cloud. Twenty-six air samplers, fourteen of which held charcoal cartridges in addition to glass fiber filters, were in operation at off-site locations. Three dose rate recorders were positioned to intercept the release. Figure 3 indicates dose rate recorders and air sampling locations for Johnie Boy.

Aerial Cloud Tracking

The aerial team in the WB-50 aircraft tracked the cloud from 0945 to 1405 hours PDT. The cloud first entered the off-site area at 1125 hours when a maximum reading of 100 mr/hr was found at 18,500 feet MSL on a pass from seven miles southwest to two miles northwest of Reed, Nevada. By the time the tracking mission was near completion, the high portion of the cloud was located ten

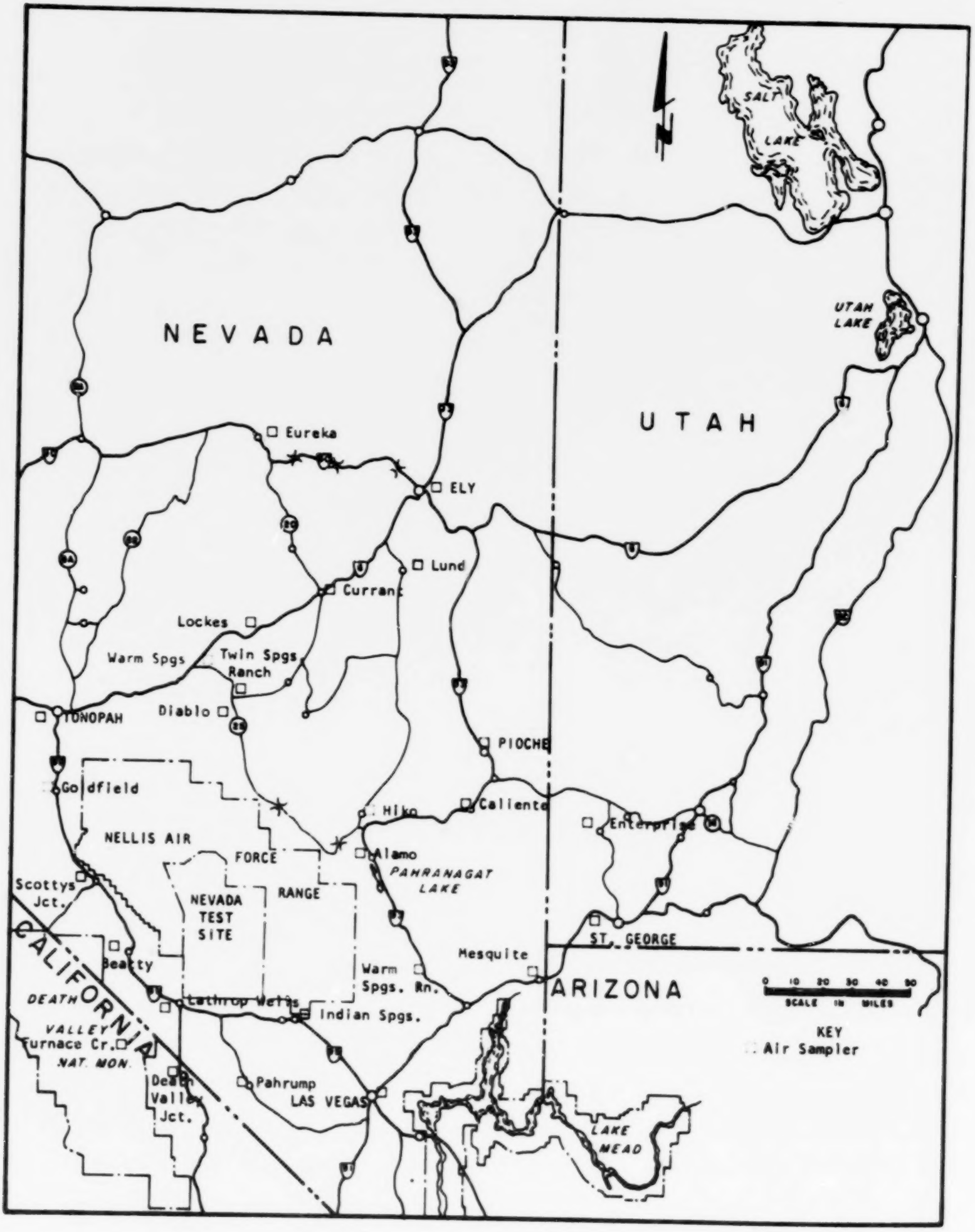

Figure 2. Air sampling locations for Little Feller II.

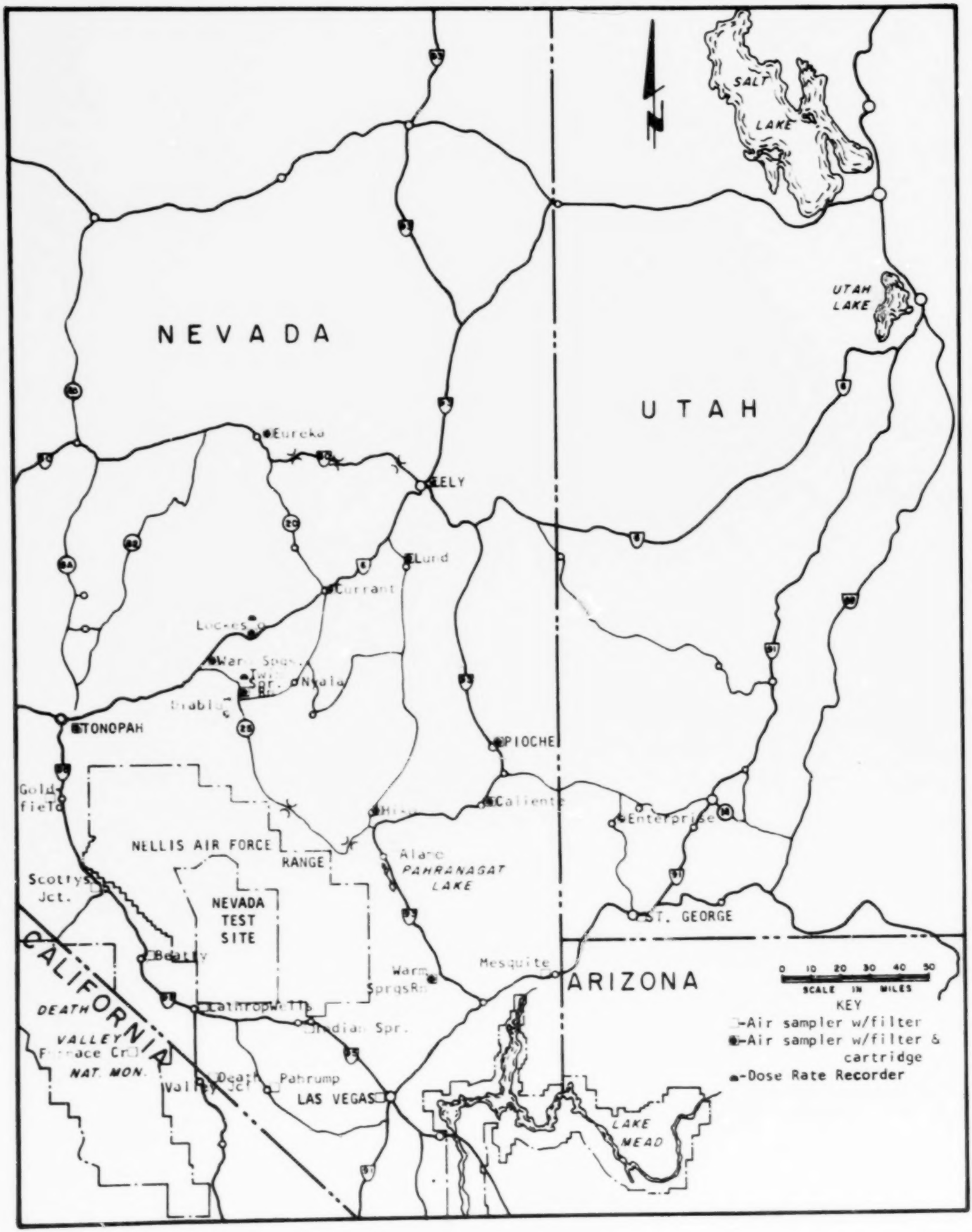

Figure 3. Air sampling and dose rate recorder locations for Johnie Boy.

miles northeast of Lockes, Nevada over Highway 6 where a reading of 0.5 mr/hr was encountered.

The aerial team in the U3-A tracked the cloud from 0945 to 1540 and was temporarily terminated in order to refuel at Tonopah, Nevada. Due to the eventual splitting of the cloud into two portions as a result of wind shear, the U3-A monitoring team did not detect any readings above background in the off-site area following Johnie Boy.

Aerial cloud tracking dose rate readings from portable monitoring instruments are not corrected for aircraft attenuation, air attenuation, geometry, aircraft and instrument contamination, and the inherent inaccuracies of taking instrument readings in high speed aircraft while in a cloud for a very short time. These data cannot be used to extrapolate ground contamination or airborne radioactivity at ground level.

Ground Monitoring at Populated Locations

Gamma dose rates above background were first detected by ground monitoring teams in a populated location at Diablo at 1247 hours PDT. A maximum measurement of 0.3 mr/hr was observed at 1254 hours and readings returned to background by 1316 hours.

At Warm Springs, seventy-four miles north of Ground Zero, the cloud was first detected at 1405 hours. The maximum

reading was 2 mr/hr between 1435 and 1455 hours. By 1510 hours the dose rate was down to 0.4 mr/hr. The maximum dose rate in a populated area was 3.0 mr/hr found at 1547 hours at Rattlesnake Maintenance Station, about ninety-two miles north of Ground Zero. By 1803 hours, the dose rate had decreased to 1.4 mr/hr. Ground monitoring on the following day resulted in no readings above background in the off-site area.

The highest dose rates for populated locations are listed in Appendix A.

Dose Rate Recorders

Three recorders used during this event were located in the off-site area in a position to intercept the effluent. The recorder at Diablo indicated time of cloud arrival to be 1236 hours PDT and a peak dose rate of 0.3 mr/hr at 1241 hours was noted. Dose rate returned to background by 1352 hours.

The recorder at Twin Springs indicated time of cloud arrival to be 1145 hours with the peak dose rate of 3.8 mr/hr occurring at 1316 hours. (See Figure 4).

The recorder at Lockes was affected by power fluctuations and it is not certain to what extent the data from this station were influenced. However, there were dose rates indicated with a maximum of 0.35 mr/hr at 1625 hours. All of the above readings were obtained on July 11, 1962.

Air Sampling

Analysis for gross beta activity on the glass fiber air

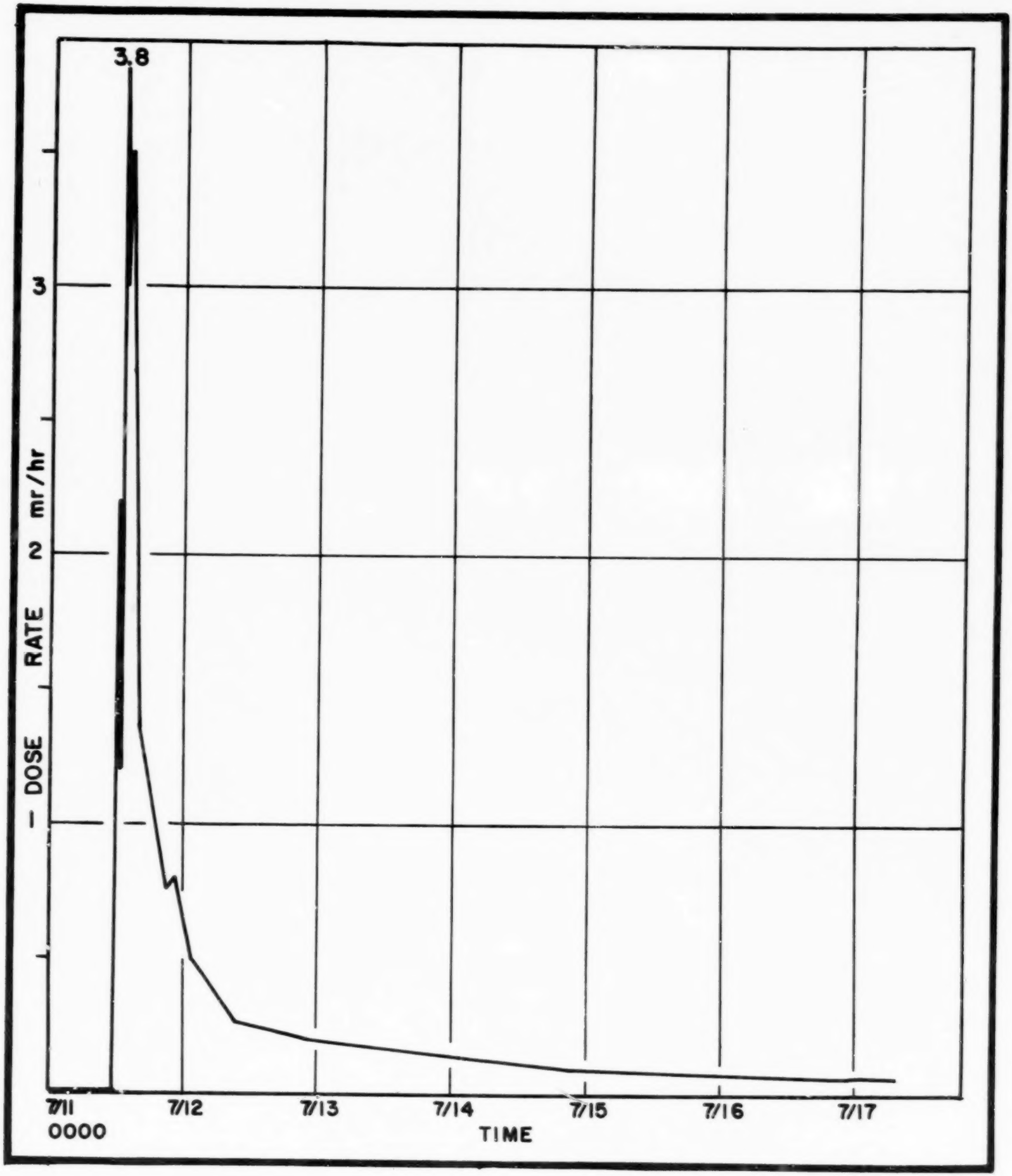

Figure 4. Dose rate recorder trace at Twin Springs for Johnie Boy.

filters from populated locations showed samples with activity above background at Diablo, Twin Springs, Warm Springs, and Lockes. Highest gross beta activity detected at a populated location was at Twin Springs, seventy-five miles from Ground Zero on a bearing of four degrees, with 23,000 pc/M^3 extrapolated to time of cloud passage.

The gross beta air filter results from populated locations are given in Table 1 of Appendix B.

Fresh fission products were identified isotopically on the glass fiber air filters and activated charcoal cartridges from Diablo, Twin Springs, Warm Springs, and Lockes. In general, the highest concentrations were found on the samples from Twin Springs. Isotopic results are also listed in Table 1 of Appendix B.

3. Small Boy

The Small Boy event, 1130 PDT, July 14, was the third test of the Dominic II series. The resulting radioactive cloud was carried in an easterly direction by prevailing winds and spread to a width of approximately 50 miles as it crossed Highway 93, east of the test range complex. The cloud then turned in a northeasterly direction and spread to a maximum width of 95 miles as it dissipated beyond the detection limits of the monitoring instruments. The peak cloud altitude was about 19,500 feet MSL.

Twenty mobile monitoring teams and an aerial cloud tracking team in a U. S. Air Force WB-50 aircraft were used in addition to 27 air samplers. Twelve of the air samplers had charcoal cartridges in addition to the

8" x 10" glass fiber prefilters; the remainder had only the glass fiber filters. Four dose rate recorders were positioned to intercept the effluent. Figure 5 shows the instrument and air sampling locations used for the Small Boy event.

Aerial Cloud Tracking

The WB-50 aircraft tracked the cloud from 1130 hours until 1600 hours PDT when the mission was terminated due to low fuel. Over the dry lake bed in the Desert Game Range, south of Pahranagat Valley, a dose rate of 6 mr/hr was noted at 1536 hours. Readings are gross gamma and are not corrected for the aircraft attenuation of 30 to 50 per cent.

Ground Monitoring

Due to the low wind velocity, radiation intensities were low at off-site locations. The highest off-site reading was 14 mr/hr taken thirteen miles south of Alamo at 1700 and 1743 hours. At Alamo the dose rate was 1.5 mr/hr at 1721 hours and by 1900 hours had dropped to 1.0 mr/hr. At Alko, four miles north of Alamo, a maximum reading of 3.5 mr/hr was detected at 1758 hours. The dose rate had dropped to 1.1 mr/hr by 1805 hours and to 0.5 mr/hr at 1930 hours. The following day additional dose rates were recorded. For ground monitoring results consult Table 2 of Appendix A.

Dose Rate Recorders

Background readings were noted at two of the four recorders operated during this event. One recorder, located at Alko, Nevada, first detected the cloud at

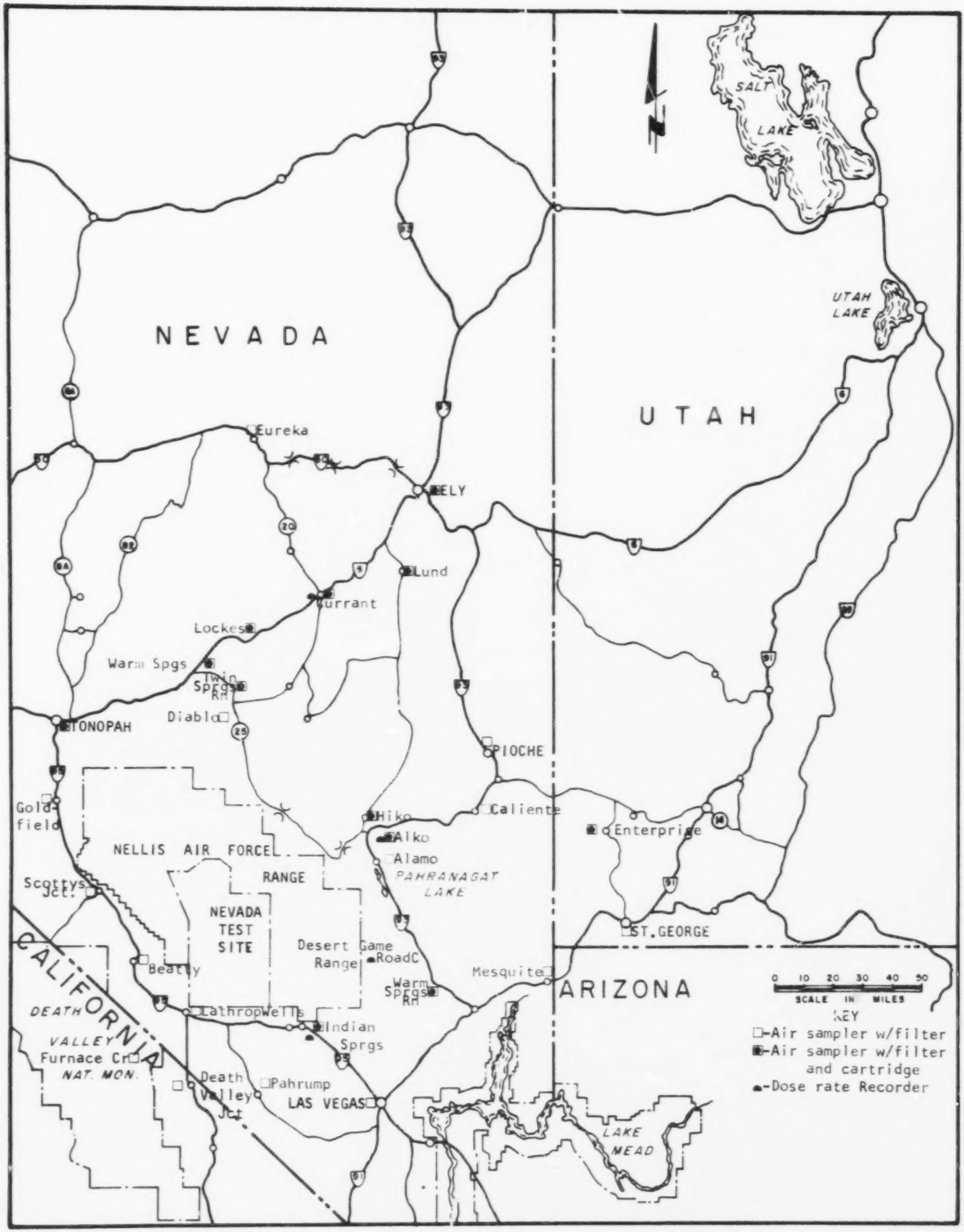

Figure 5. Air sampling and dose rate recorder locations for Small Boy.

1675 hours with 0.08 mr/hr and returned to background from 1642 to 1648 hours. Readings above background began again at 1655 hours and reached a maximum of 1.7 mr/hr at 1757 hours. At 1215 hours on July 15, the dose rate was 0.14 mr/hr. The recorder located forty miles north of the Desert Game Range station first detected the cloud at 1429 hours. The maximum reading on this recorder was 38 mr/hr at 1608 to 1614 hours. At 1835 hours the dose rate was 12 mr/hr. (See Figures 6 and 7).

Sampling

Analysis of glass fiber air filters for gross beta activity showed samples with activity significantly above background at Alamo, Alko, Caliente, Mesquite, Nevada and Enterprise and St. George, Utah. The highest activity detected at peak of cloud passage in an air sample was 140,000 pc/M^3 at Alko, fifty-eight miles from Ground Zero on a bearing of 45 degrees. For the remainder of the air sample data and isotope analyses, consult Appendix B.

4. Little Feller I

The Little Feller I event, 1000 PDT, July 17, was the last test of the Dominic II series. The radioactive cloud from this event was carried in a northerly direction by prevailing winds.

Seven mobile ground monitoring teams and an aerial monitoring team in a U. S. Air Force U3-A aircraft tracked the cloud. Twenty-six air samplers, ten of which held charcoal cartridges in addition to glass

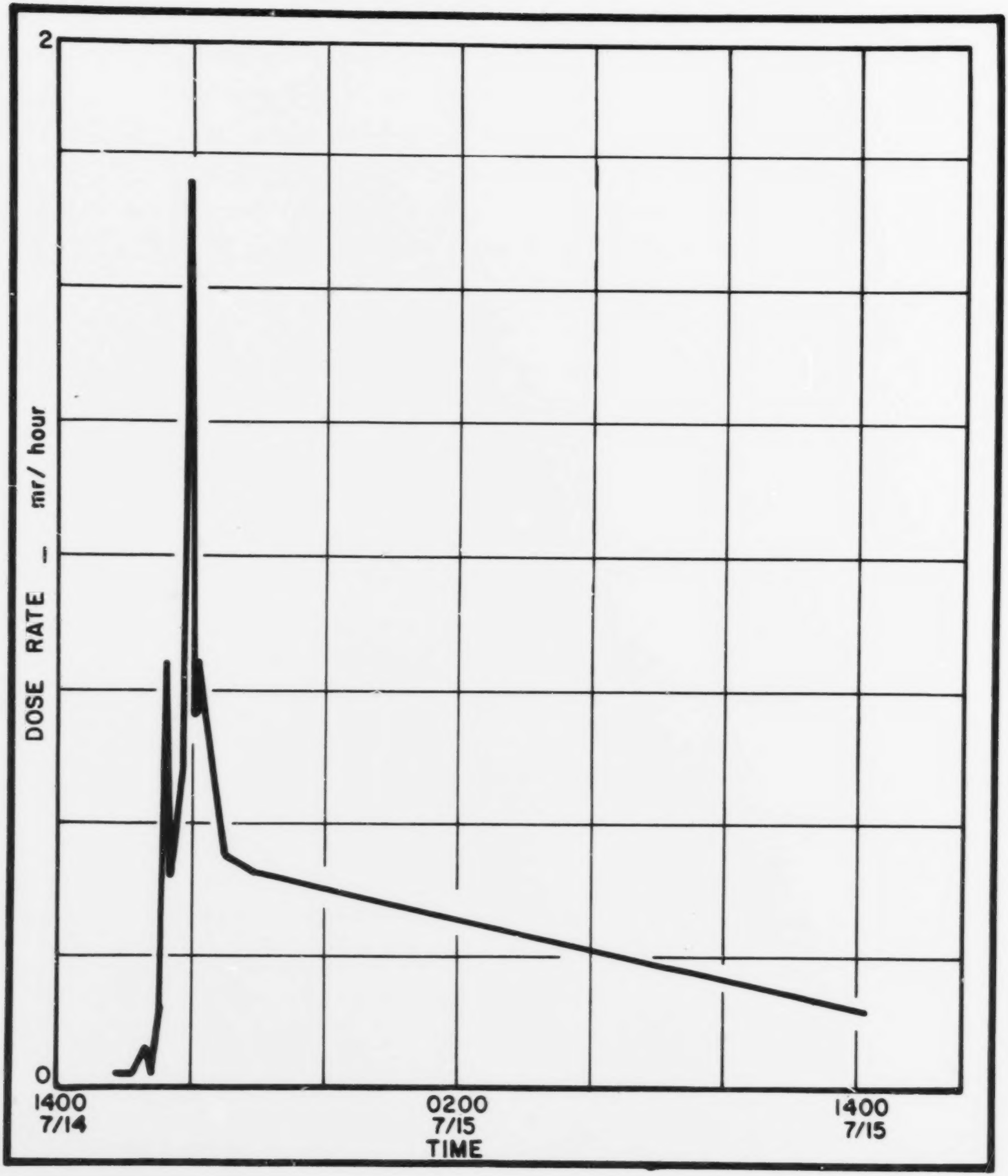

Figure 6. Dose rate recorder trace at Alko for Small Boy.

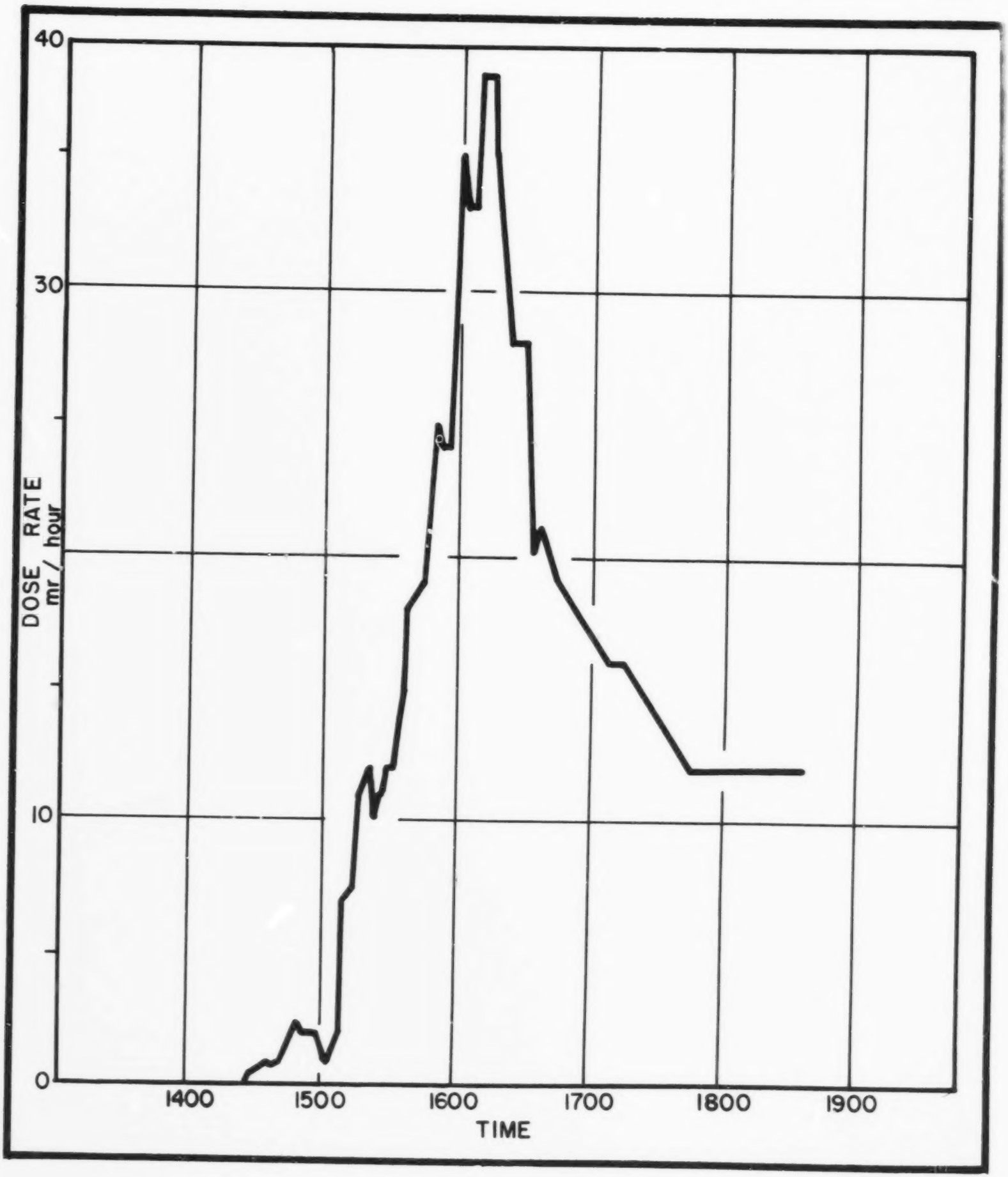

Figure 7. Dose rate recorder trace at Desert Game Range (Road C) for Small Boy.

fiber filters, were in operation at off-site locations. Three dose rate recorders were positioned to intercept the effluent. Instrument and air sampling locations are found in Figure 8.

Aerial Cloud Tracking

The aerial cloud tracking team in the U3-A aircraft tracked the cloud from 1000 to 1245 hours PDT. The visible cloud had dissipated by 1045 hours and the remainder of the tracking mission did not result in any readings above background in the off-site area.

Ground Monitoring

Ground monitoring in populated locations indicated no gamma dose rates above background.

Dose Rate Recorders

A dose rate recorder located at Twin Springs Ranch, indicated a peak reading at 1500 hours on July 17 of 0.7 mr/hr. Another, located at Lockes, showed a rise to 0.1 mr/hr at 1730 hours on July 17.

Air Sampling

Glass fiber air filters were analyzed for gross beta activity. The five highest samples with activity above background concentrations are shown in Appendix B. Isotopic results are also given for charcoal cartridges.

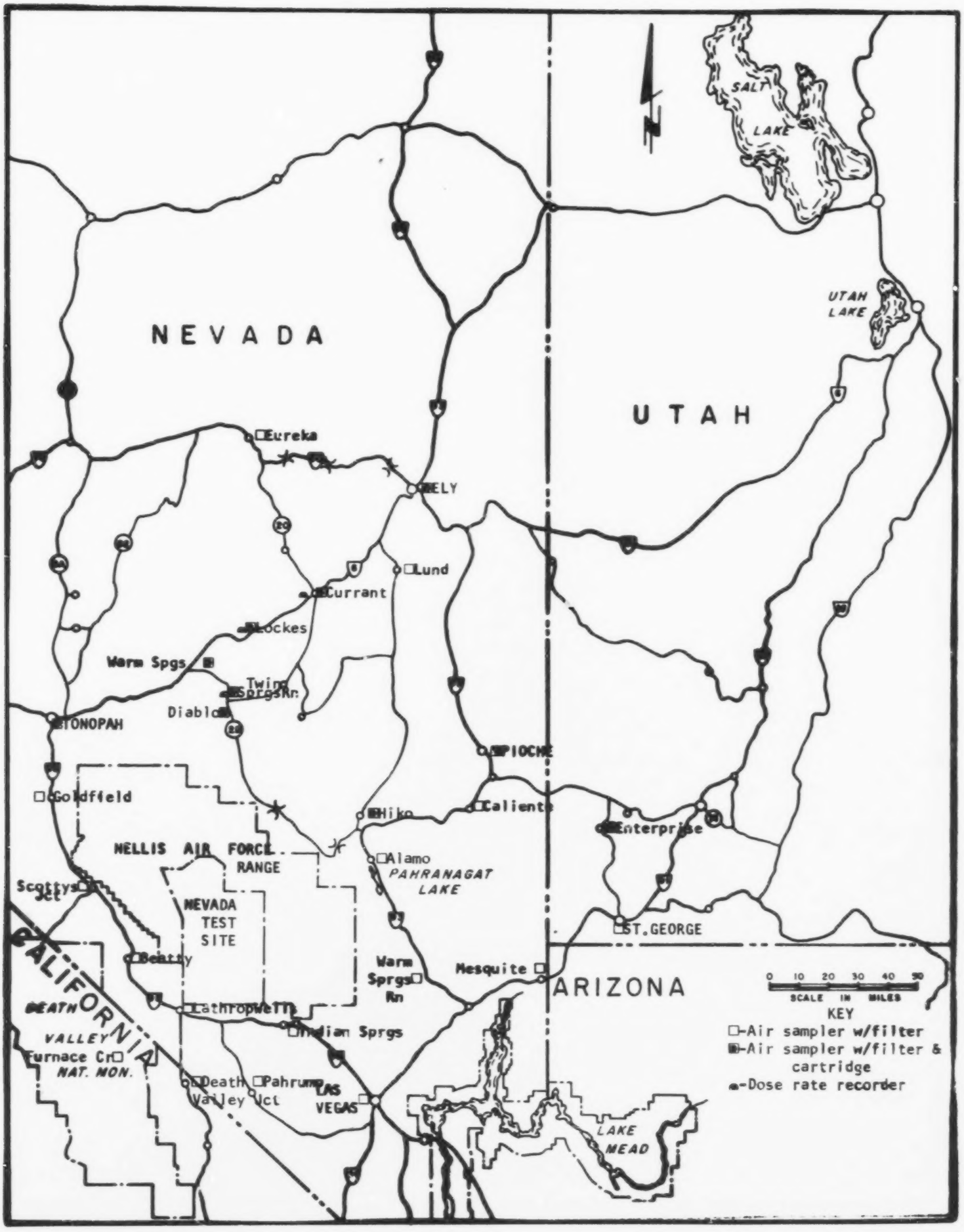

Figure 8. Air sampling and dose rate recorder locations for Little Feller I.

APPENDIX A

HIGHEST DOSE RATES MEASURED OFF-SITE AT POPULATED LOCATIONS FOR OPERATION DOMINIC II

Table Number		Page
Table 1.	Highest dose rates measured with portable instruments at populated off-site areas during surveillance of the Johnie Boy event, 7/11/62.	A-1
Table 2.	Highest dose rates measured with portable instruments at populated off-site areas during surveillance of the Small Boy event, 7/14/62.	A-1

NOTES: Azimuth and distance in tables of dose rate measurements are given with respect to the Ground Zero of each event.

The time at which a dose rate was measured is always in the column heading as the prevailing local clock time.

Dose rate measurements above background following the Little Feller I event are given on page 43. Ground monitoring for this event resulted in no measurements above background.

No dose rate measurements above background were obtained following the Little Feller II event.

Table 1. Highest dose rates measured with portable instruments at populated off-site areas during surveillance of the Johnie Boy event, 7/11/62.

Azimuth (°)	Distance (miles)	Location (Nevada)	Clock Time (PDT)	Gamma Dose Rate (net mr/hr)
4	92	Rattlesnake Maint. Station	1547	3.0
356	74	Warm Springs	1435	2.0
16	104	Lockes	1610	1.8
354	79	M and M Mine	1445	0.8
12	57	Diablo	1254	0.3
358	96	Hot Creek Ranch	1549	0.3
344	74	Clark Station	1545	0.1
345	78	Stone Cabin Ranch	1430	0.05

Table 2. Highest dose rates measured with portable instruments at populated off-site areas during surveillance of the Small Boy event, 7/14/62.

Azimuth (°)	Distance (miles)	Location (Nevada)	Clock Time (PDT)	Gamma Dose Rate (net mr/hr)
45	58	Alko	1758	2.5
47	58	Alamo	1721	1.5
41	62	Ash Springs	1745	0.32
74	82	Carp	1908	0.47
63	86	Elgin	1945	0.42
53	96	Caliente	2145	0.32

APPENDIX B

AIR SAMPLING DATA OBTAINED FOR OFF-SITE SURVEILLANCE OF THREE EVENTS OF OPERATION DOMINIC II

Table Number		Page
Table 1.	Five highest concentrations of activity in air sampled by filters and cartridges at off-site locations during the Johnie Boy event.	B-1
Table 2.	Five highest concentrations of activity in air sampled by filters and cartridges at off-site locations during the Small Boy event.	B-2
Table 3.	Five highest concentrations of activity in air sampled by filters and cartridges at off-site locations during the Little Feller I event.	B-3

NOTES: In the tables of Appendix B, azimuth and distance are given with respect to the Ground Zero for each event.

Time is given as the prevailing clock time (PDT) at the Nevada Test Site.

Abbreviations used throughout these tables are:

F = 8"x 10" glass fiber filter
C = MSA charcoal cartridge
ND = not detected
D = detected, but in amounts too small to quantitate

Extrapolated to:

CP - time of peak cloud activity during cloud passage over that location
MP - mid-point of the sampling period
TC - time at which the count was taken

Table 1. Five highest concentrations of activity in air samples by filters and cartridges at off-site locations during the Johnie Boy Event.

I. STATION LOCATION			II. COLLECTION DATA								III. RADIOASSAY DATA								
				SAMPLING PERIOD							GROSS β COUNT			GAMMA PULSE HEIGHT ANALYSIS					
				BEGIN			END							ACTIVITY (pc/M^3)					
STATION NAME	AZIMUTH (°)	DISTANCE (miles)	AIR VOLUME (M3)	Month	Day	Time	Month	Day	Time	COLLECTOR	CORR. TO:	AC-TIVITY (pc/M^3)	CORR. TO:	I^{131}	I^{133}	I^{135}	Te^{132}	$Ba\ La^{140}$	Ru^{103}	$Zr\ Nb^{95}$
Twin Springs	4	75	470	7	11	0600	7	11	1745	F	CP	23,000	CP	480	920	ND	720	340	ND	ND
										C	--	---	CP	16	ND	2340	22	6.1	ND	ND
Warm Springs	356	74	1400	7	10	0600	7	11	1545	F	CP	7500	CP	65	500	ND	190	8.5	ND	ND
										C	--	---	CP	5.1	110	ND	29	6.1	ND	ND
Lockes	16	104	980	7	10	1615	7	11	1616	F	CP	2500	CP	23	95	ND	46	26	ND	ND
										C	--	---	CP	7.7	8.1	ND	12	4.2	ND	ND
Diablo	12	57	410	7	11	0800	7	11	1700	F	CP	1700	CP	26	50	ND	58	13	ND	ND
										C	--	---	CP	12	4.9	ND	8.8	4.2	ND	ND
Diablo	12	57	898	7	12	0700	7	13	0700	F	CP	950	--	---	---	---	---	---	---	---
										C	--	---	TC	ND	ND	ND	ND	ND	D	ND

Table 2. Five highest concentrations of activity in air sampled by filters and cartridges at off-site locations during the Small Boy Event.

I. STATION LOCATION			II. COLLECTION DATA								III. RADIOASSAY DATA							
				SAMPLING PERIOD							GROSS β COUNT		GAMMA PULSE HEIGHT ANALYSIS					
				BEGIN			END							ACTIVITY (pc/M³)				
STATION NAME	AZIMUTH (°)	DISTANCE (miles)	AIR VOLUME (M3)	Month	Day	Time	Month	Day	Time	COLLECTOR	CORR. TO:	AC-TIVITY (pc/M³)	CORR. TO:	I^{131}	Te^{132}	$Ba\ La^{140}$	$Zr\ Nb^{95}$	Ru^{103}
Alko	45	58	80	7	14	1445	7	14	1900	F	CP	140,000	CP	430	970	280	24	150
										C			CP	49	ND	ND	ND	ND
Alamo	47	58	1820	7	14	0630	7	15	1100	F	CP	24,000	-	-	-	-	-	-
Caliente	53	96	1570	7	14	1400	7	15	1500	F	CP	9300	CP	1100	2500	750	67	620
Enterprise, Utah	66	133	1200	7	14	1830	7	15	2100	F	MP	2700	MP	80	180	55	4.1	28
										C			MP	5.4	ND	ND	ND	ND
Mesquite	89	103	2120	7	14	1830	7	15	1830	F	MP	1600		-	-	-	-	-

Table 3. Five highest concentrations of activity in air sampled by filters and cartridges at off-site locations during the Little Feller I Event.

I. STATION LOCATION			II. COLLECTION DATA								III. RADIOASSAY DATA								
				SAMPLING PERIOD							GROSS β COUNT		GAMMA PULSE HEIGHT ANALYSIS						
				BEGIN			END							ACTIVITY (pc/M^3)					
STATION NAME	AZIMUTH (°)	DISTANCE (miles)	AIR VOLUME (M3)	Month	Day	Time	Month	Day	Time	COLLECTOR	CORR. TO:	AC-TIVITY (pc/M3)	CORR. TO:	I^{131}	I^{133}	Te^{132}	$Zr\ Nb^{95}$	Ru^{103}	$Ba\ La^{140}$
Twin Springs	5	75	878	7	17	0600	7	18	0600	F	CP	4200	-	-	-	-	-	-	-
										C			CP	ND	ND	ND	D	ND	ND
Warm Springs	357	74	1938	7	17	0600	7	18	0600	F	CP	3000	-	-	-	-	-	-	-
										C			CP	ND	ND	ND	ND	ND	ND
Currant	21	120	916	7	17	0705	7	18	0700	F	CP	880	-	-	-	-	-	-	-
										C			CP	D	ND	ND	ND	ND	ND
Lockes	16	103	1020	7	16	1800	7	17	1800	F	CP	530	-	-	-	-	-	-	-
										C			CP	1.3	ND	ND	ND	0.4	ND
Diablo	13	57	979	7	17	0700	7	18	0700	F	CP	37.3	-	-	-	-	-	-	-
										C			CP	ND	ND	ND	1.2	2.6	ND